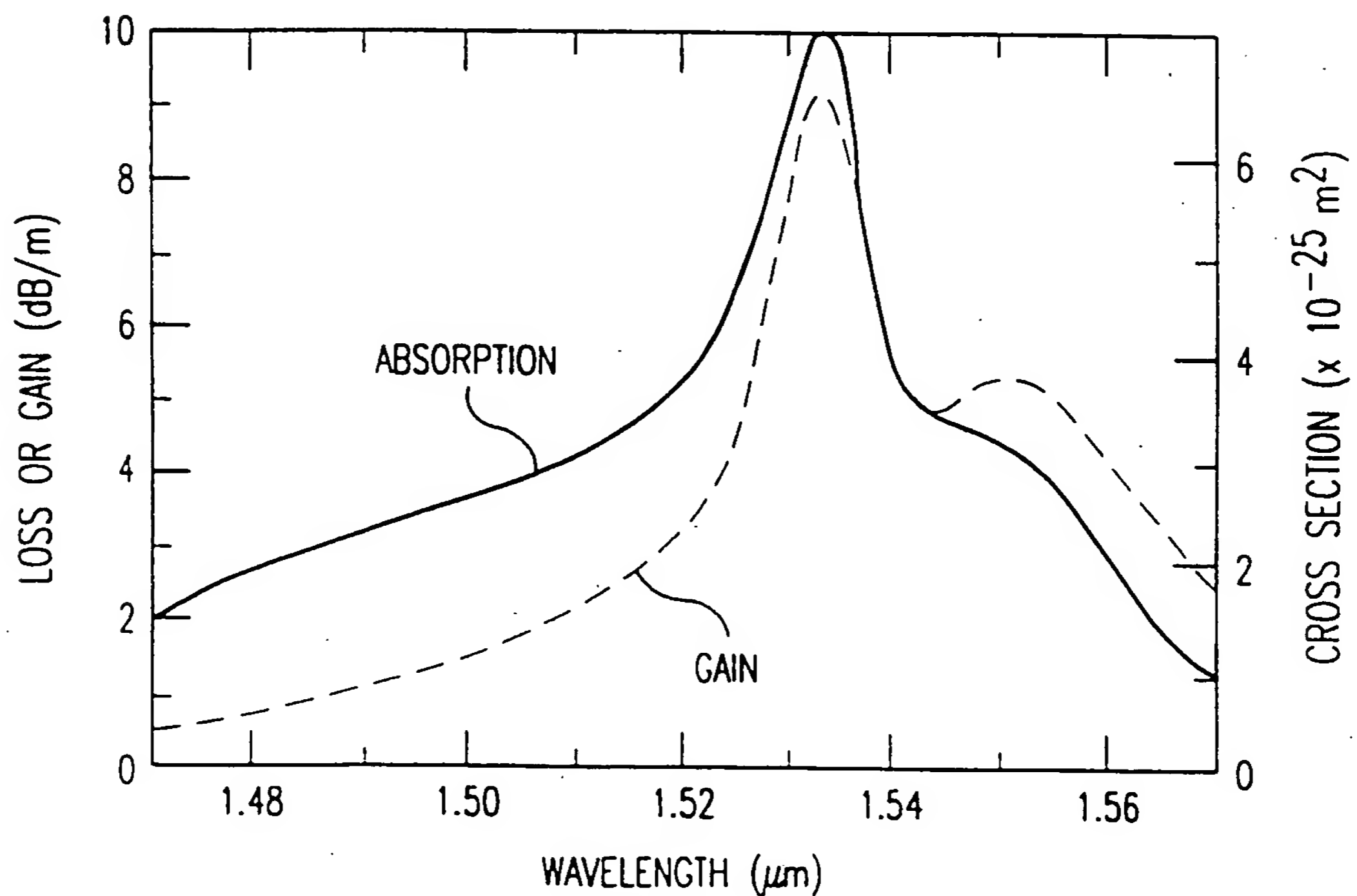
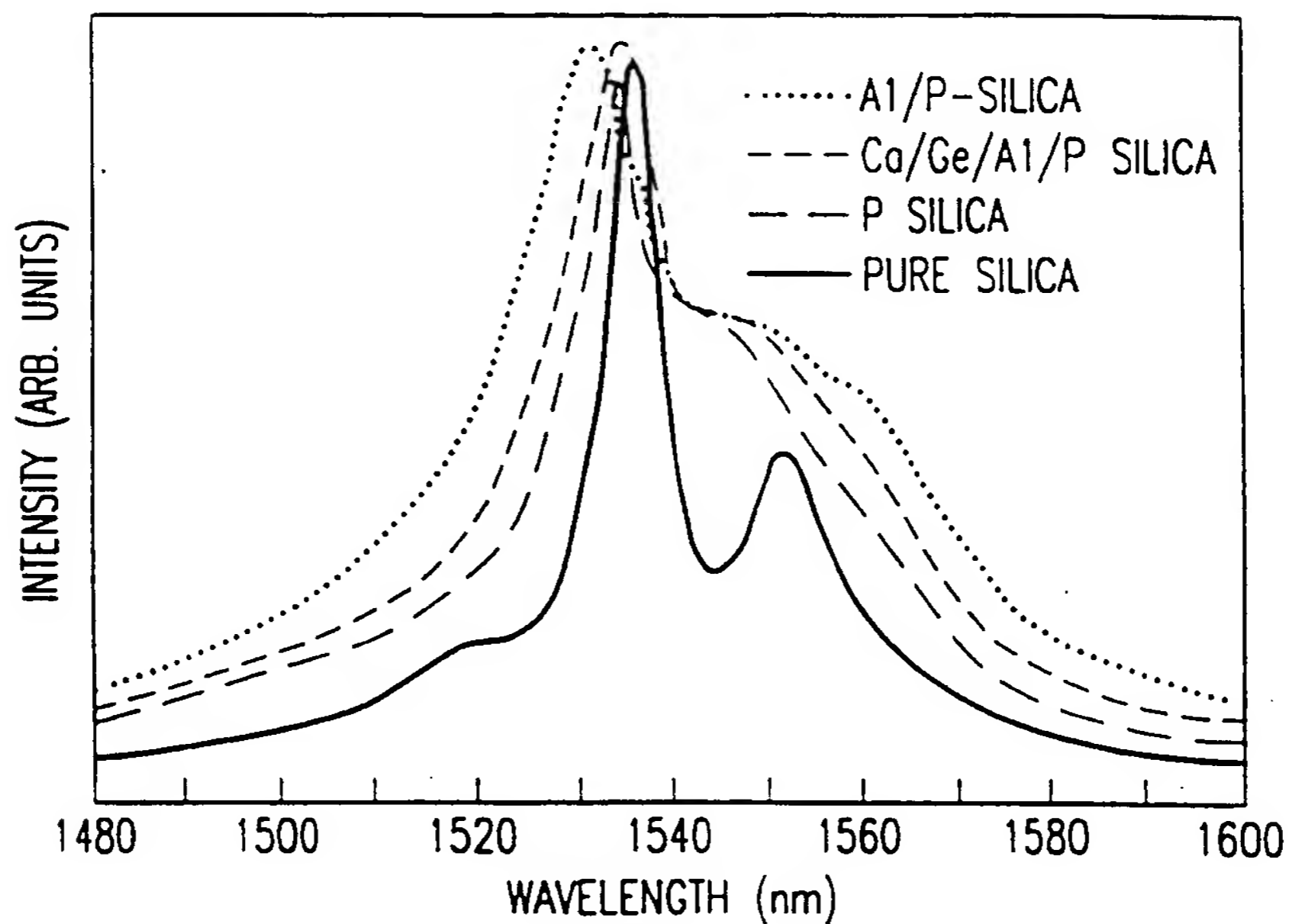


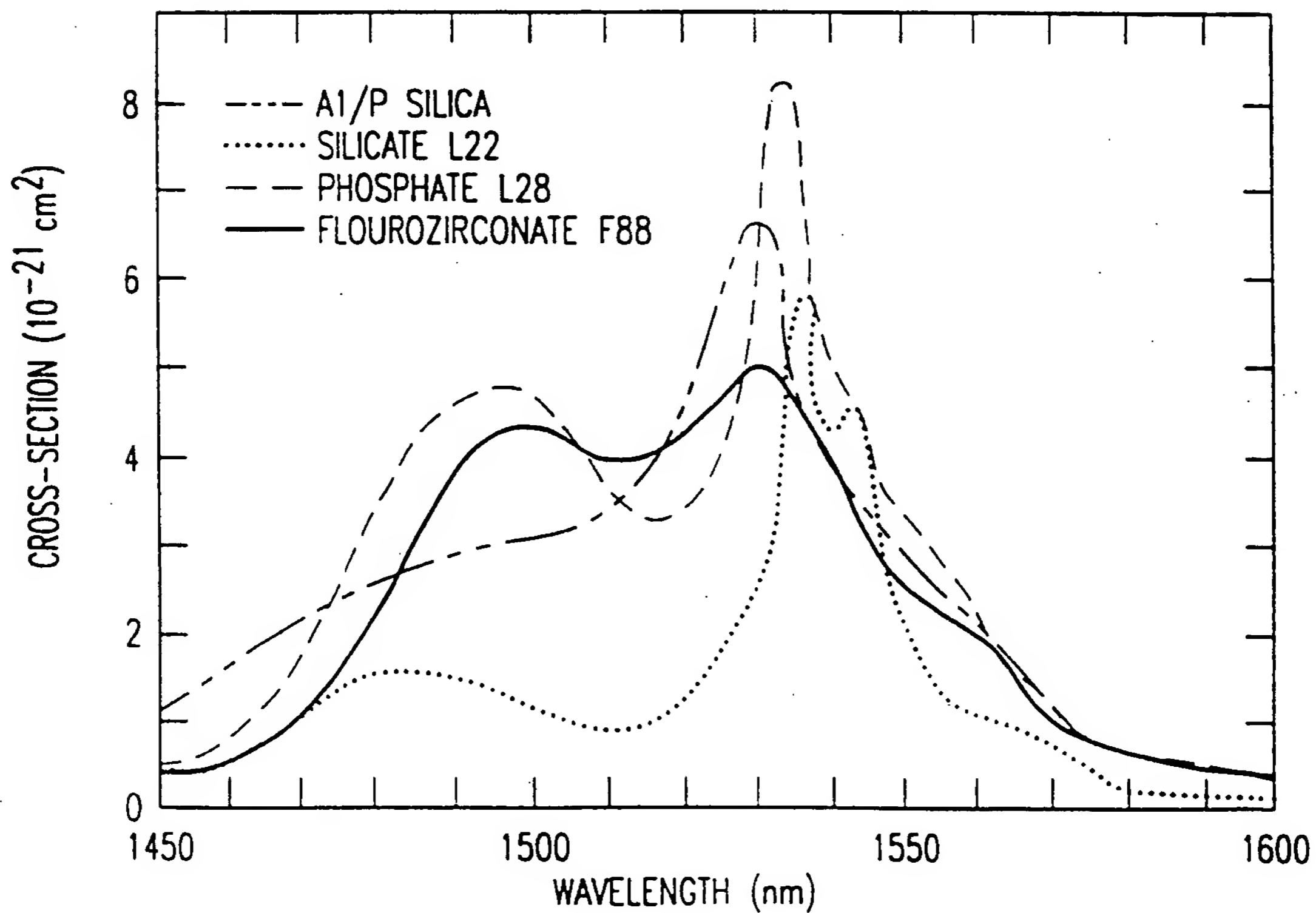
**FIG. 1**  
PRIOR ART



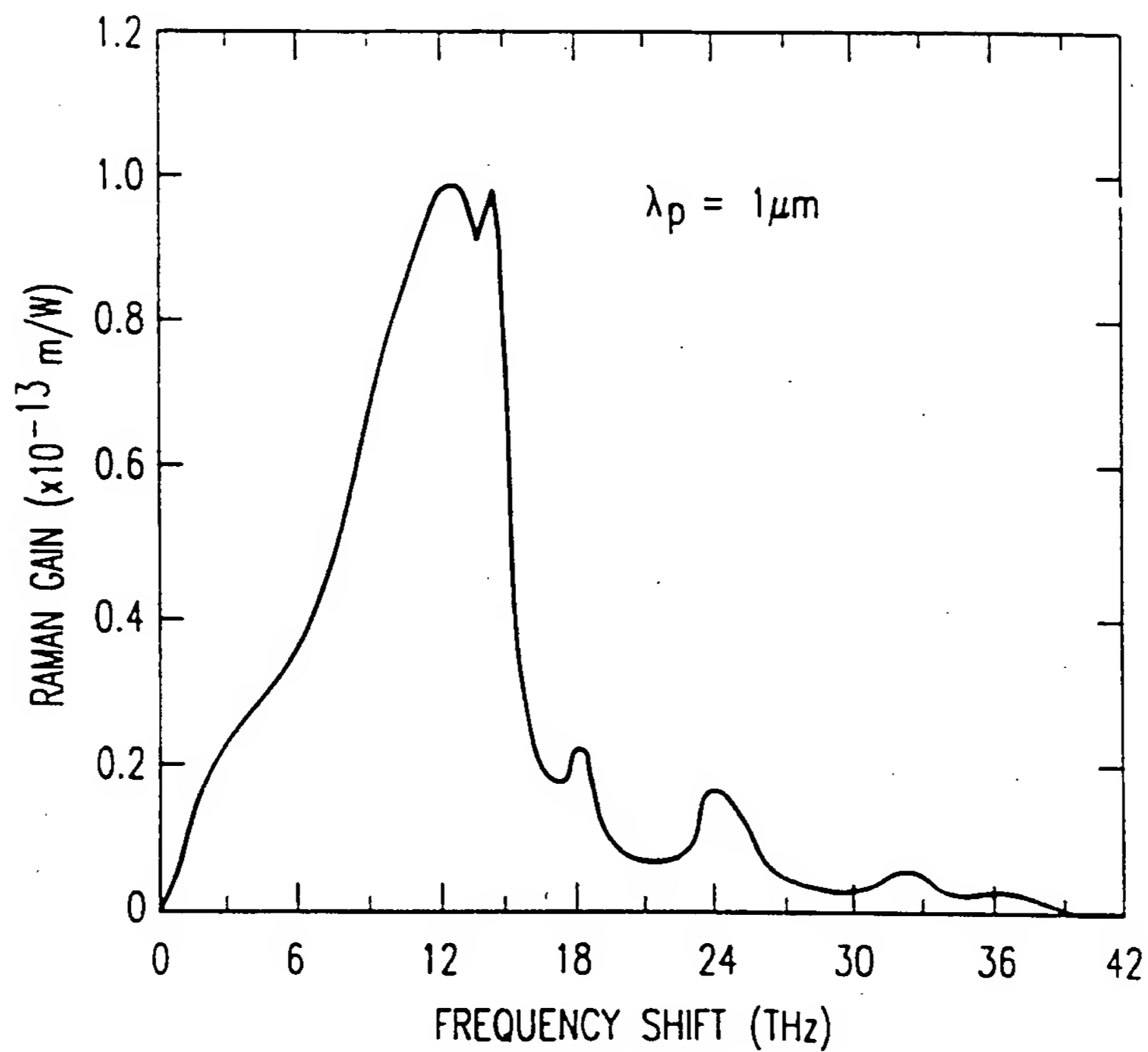
**FIG. 2**  
PRIOR ART



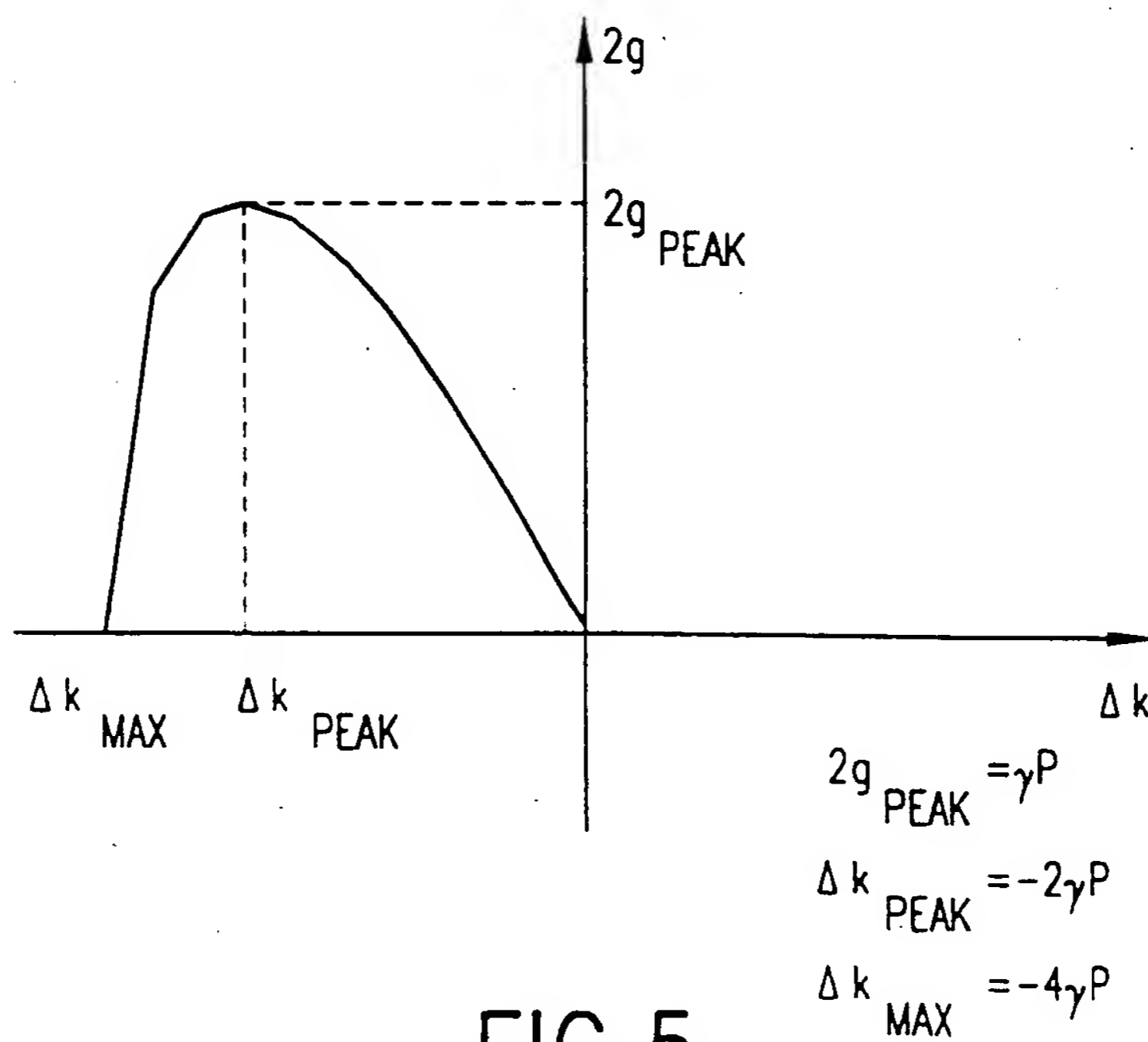
**FIG. 3a**  
PRIOR ART



**FIG. 3b**  
PRIOR ART



**FIG.4**  
PRIOR ART



**FIG.5**

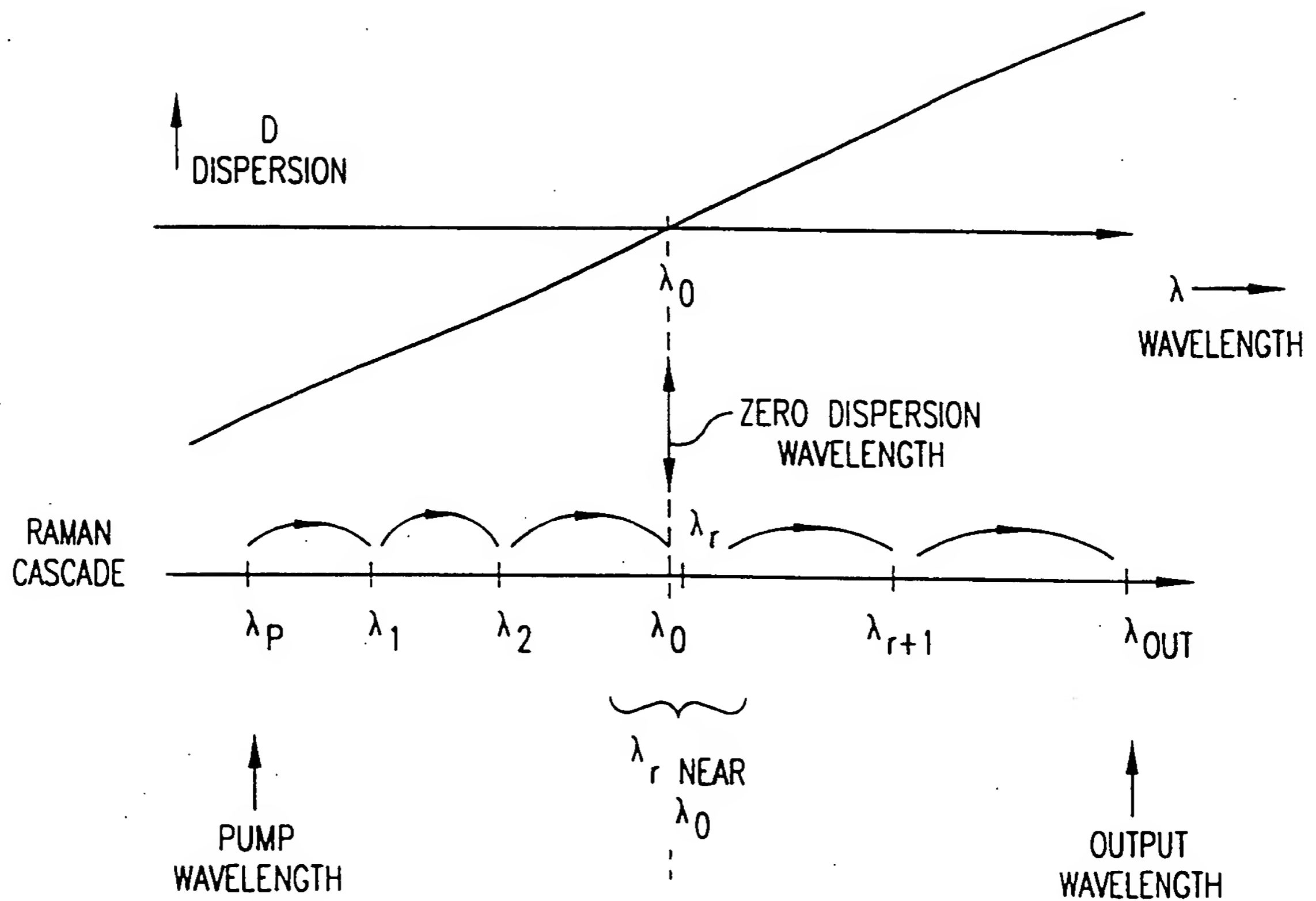


FIG.6

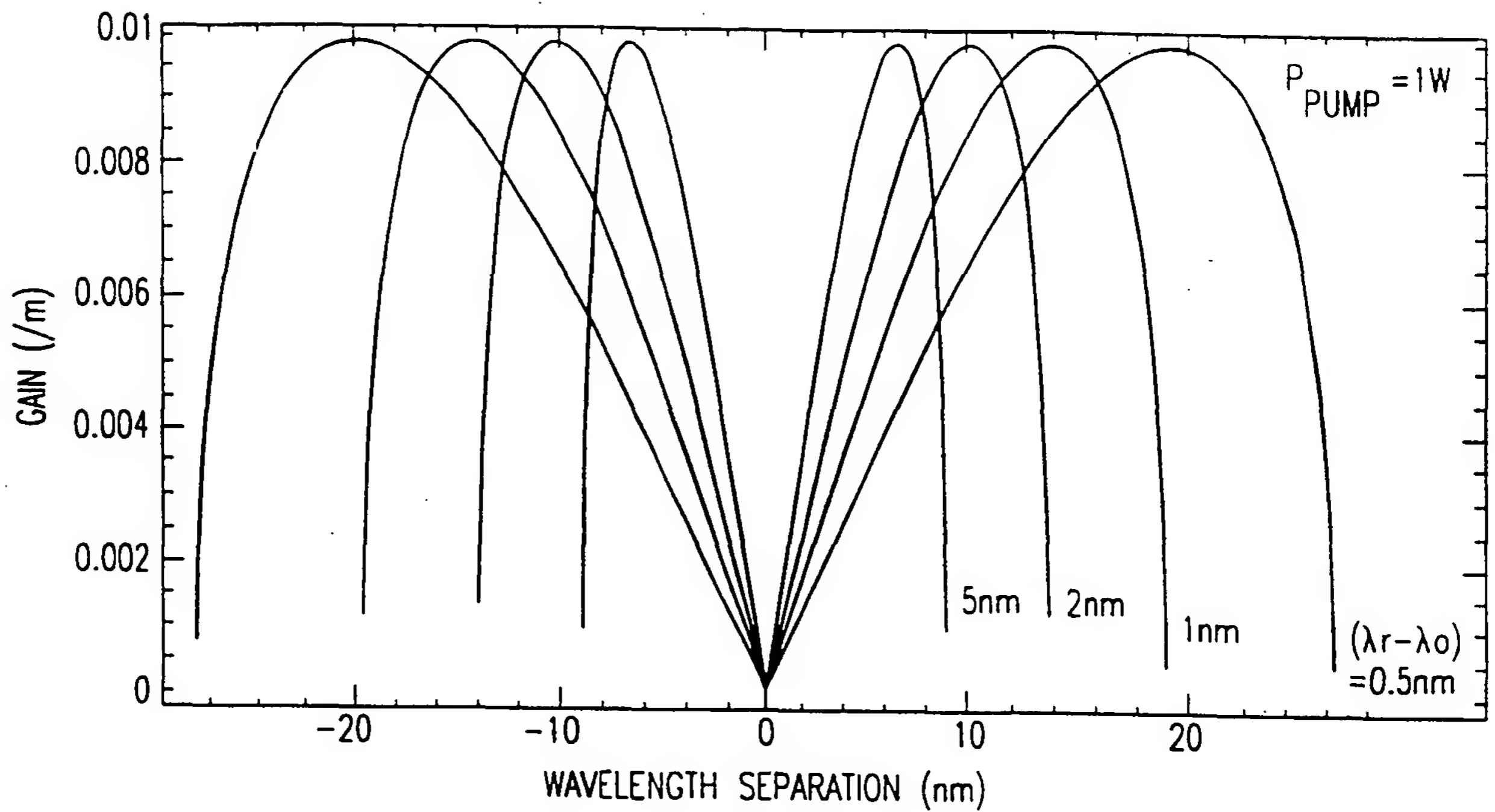


FIG.7

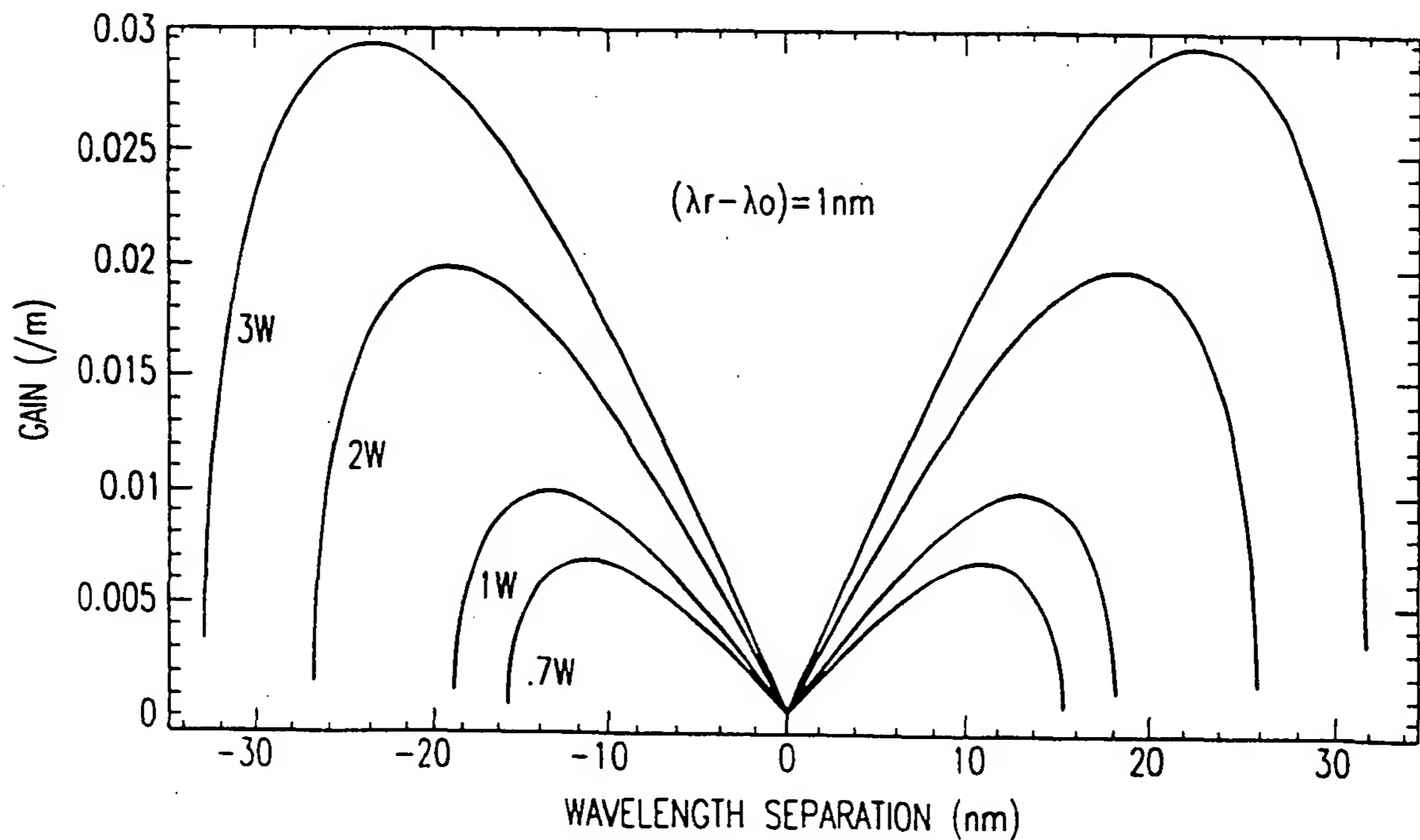


FIG.8

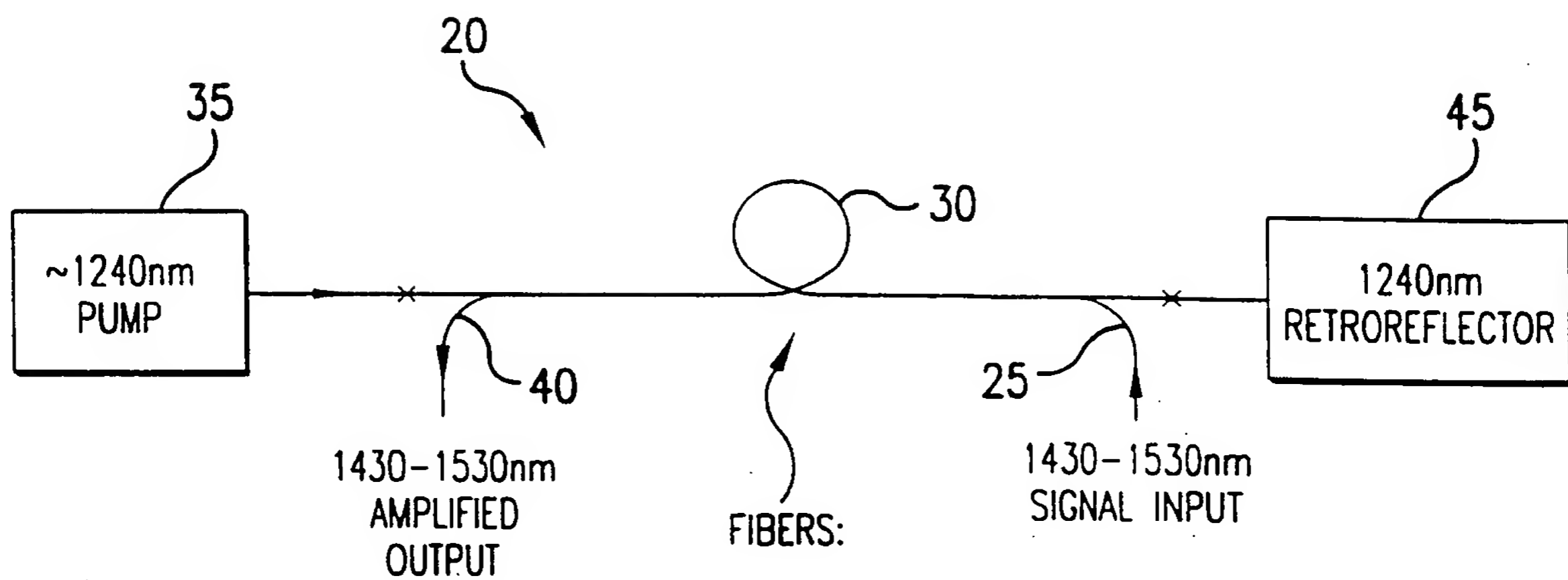


FIG. 9

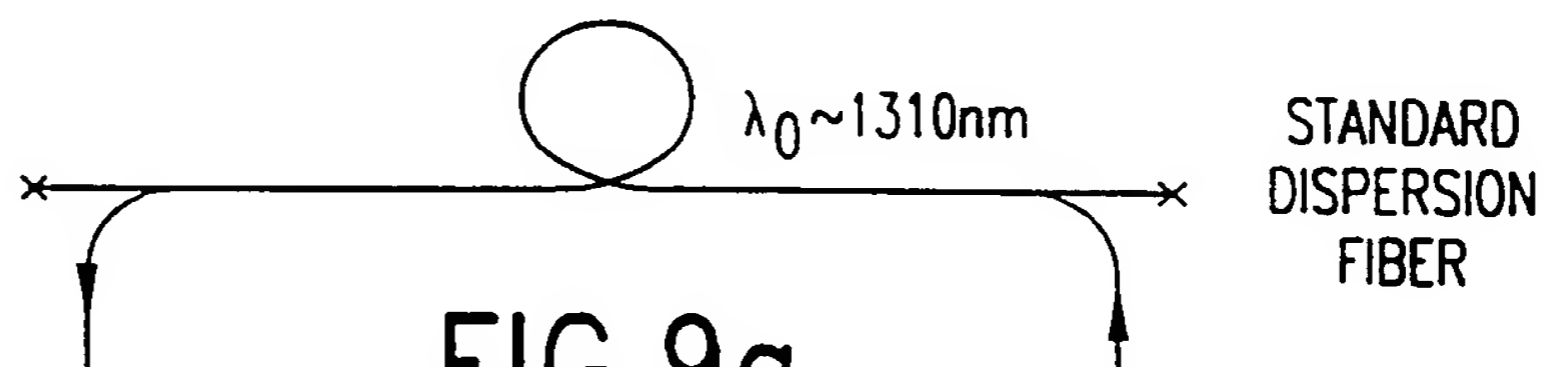


FIG. 9a

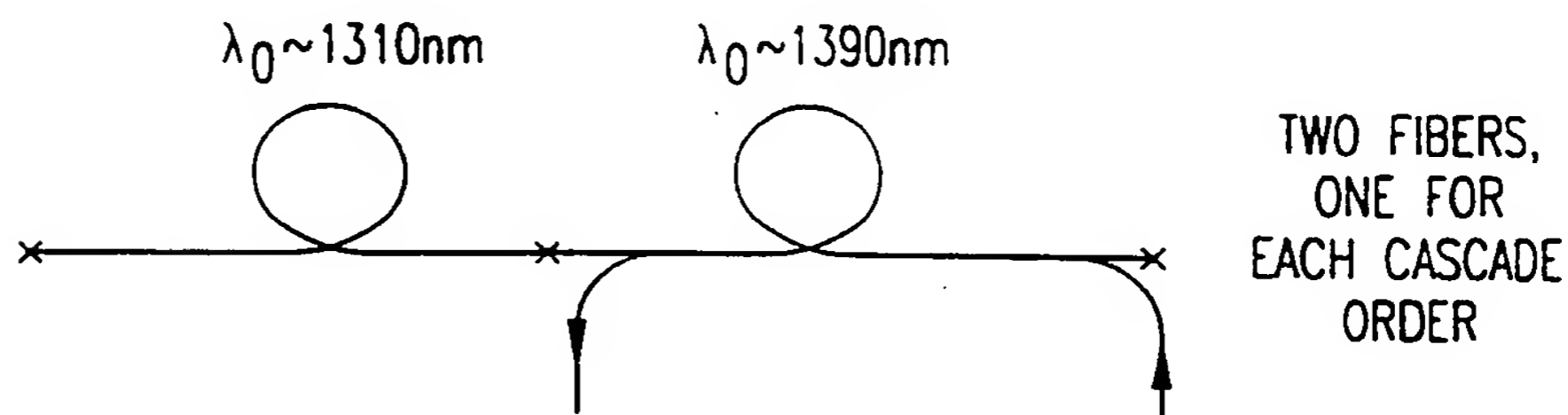


FIG. 9b

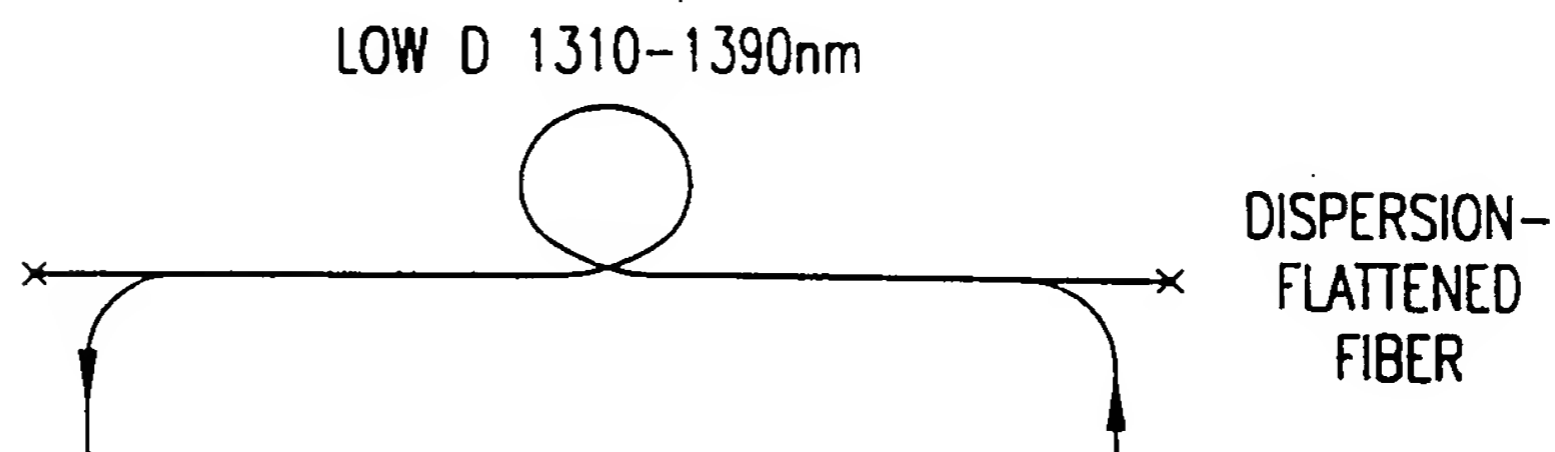


FIG. 9c

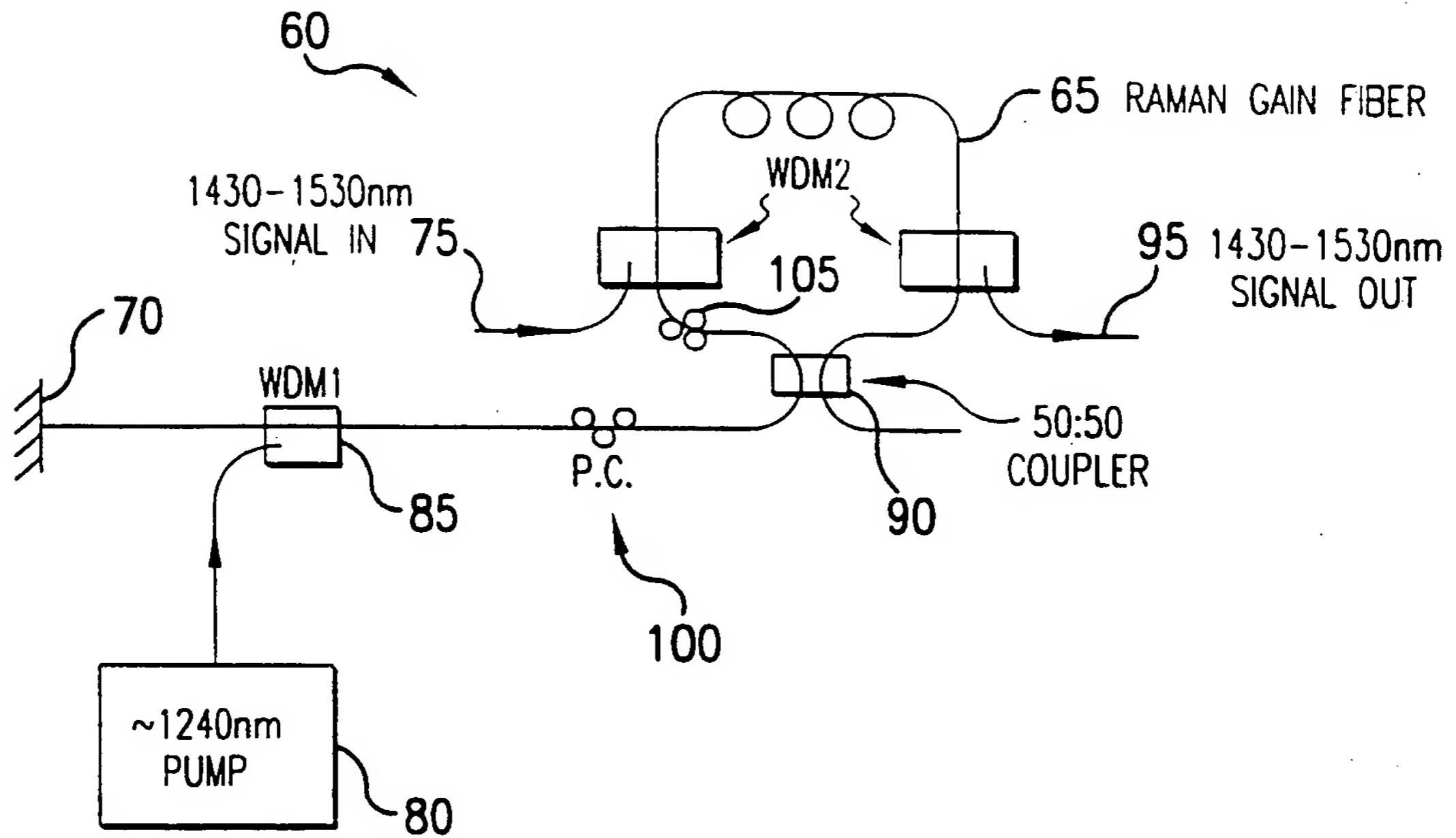


FIG.10

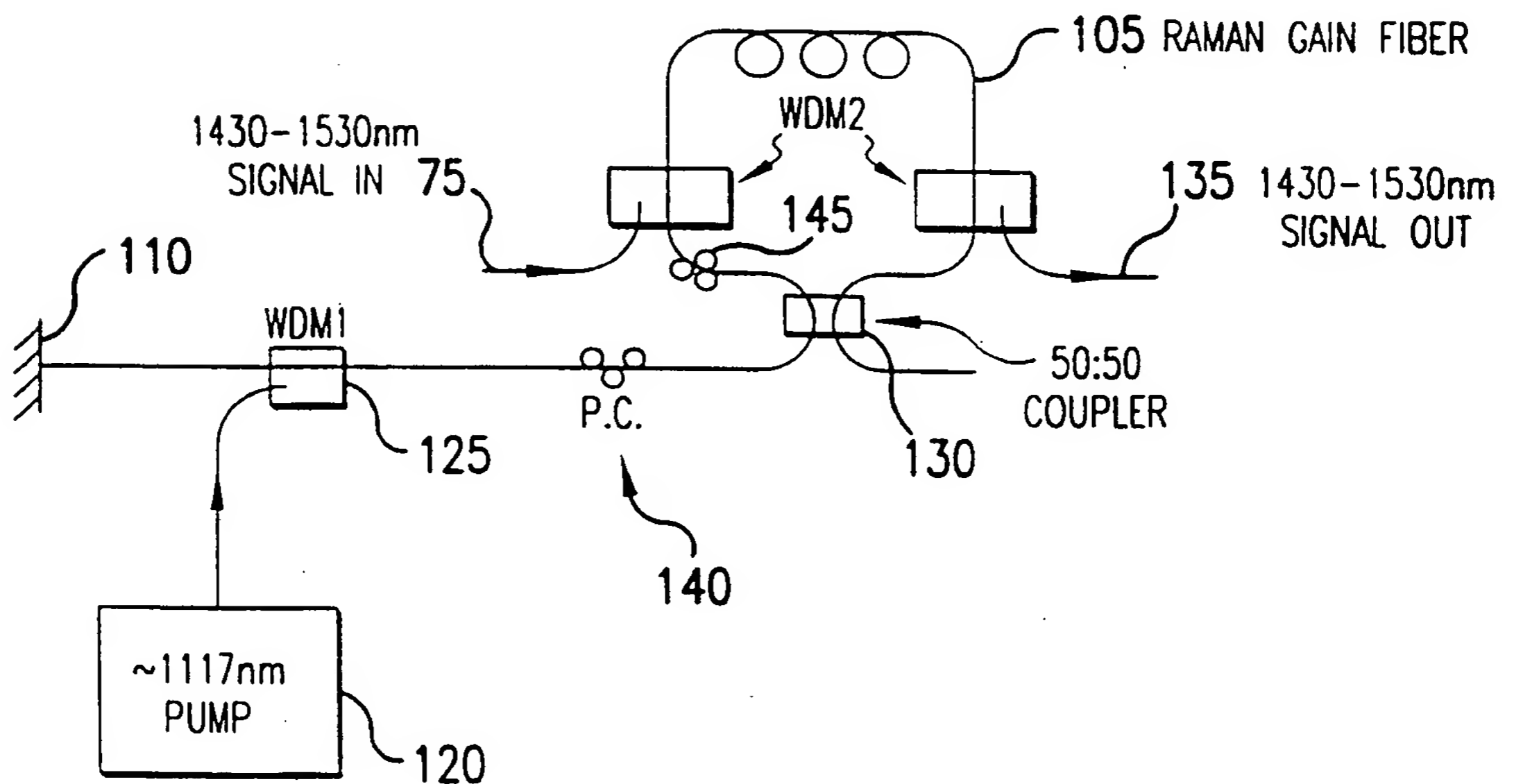


FIG.11

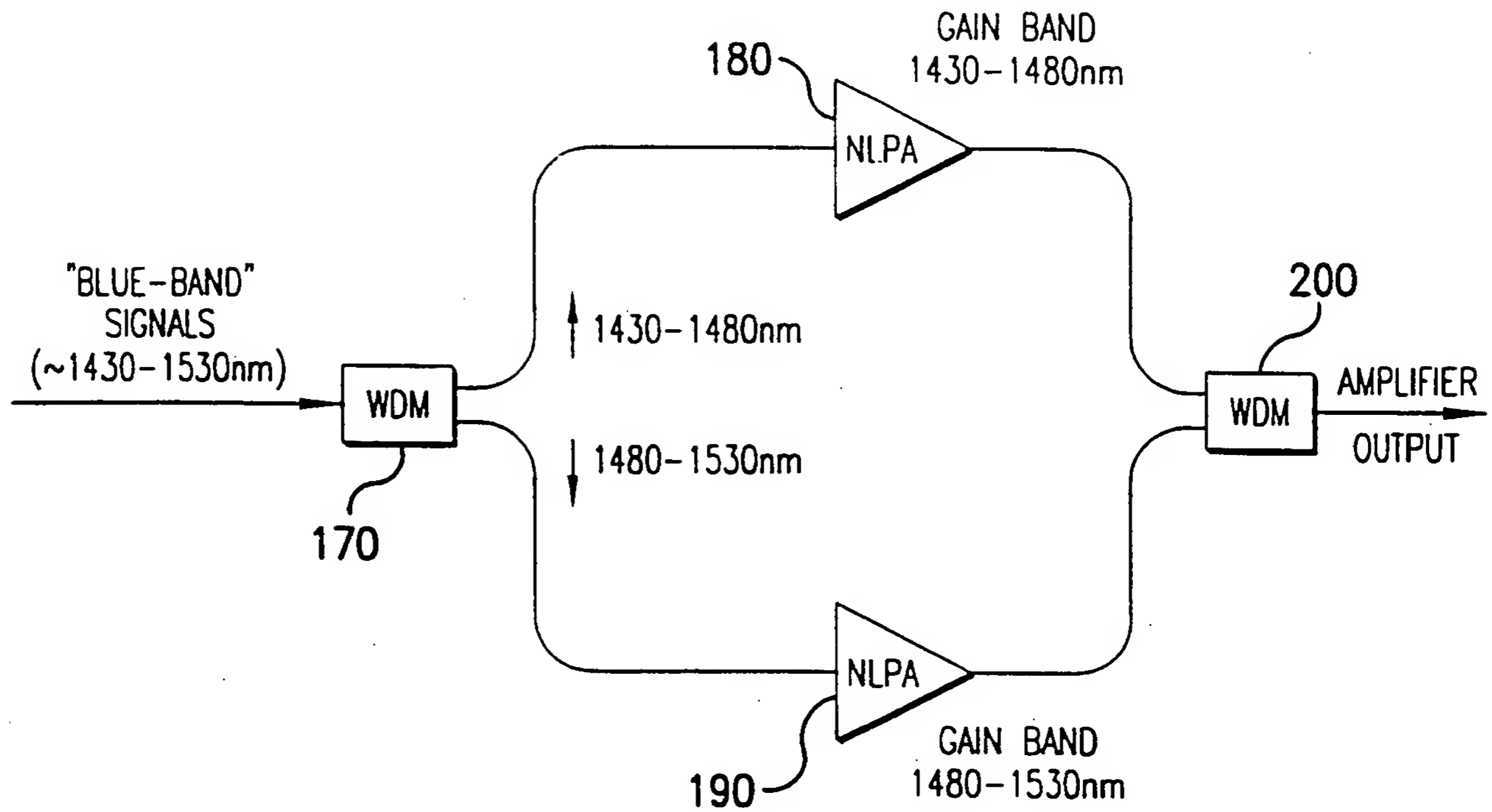


FIG.12

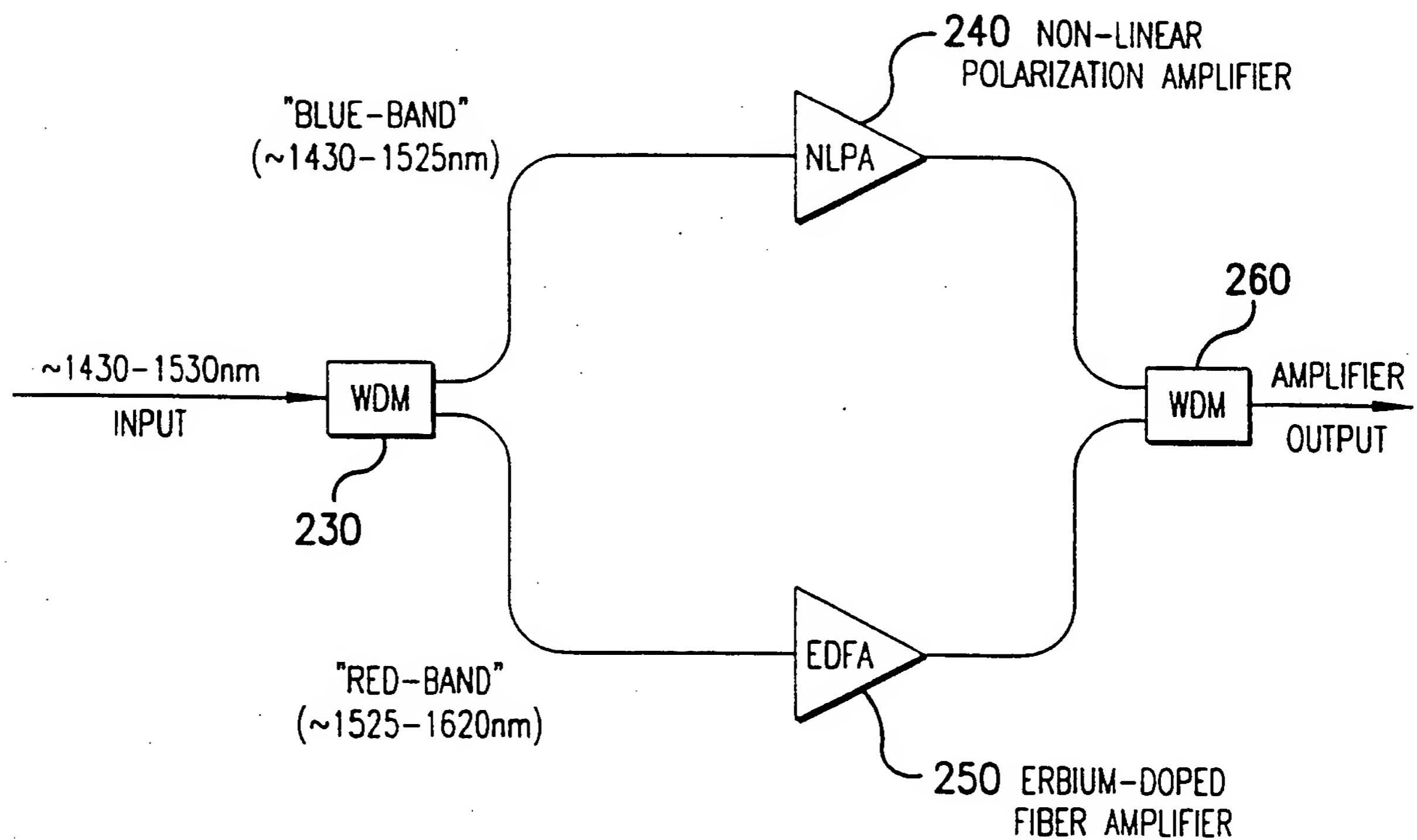
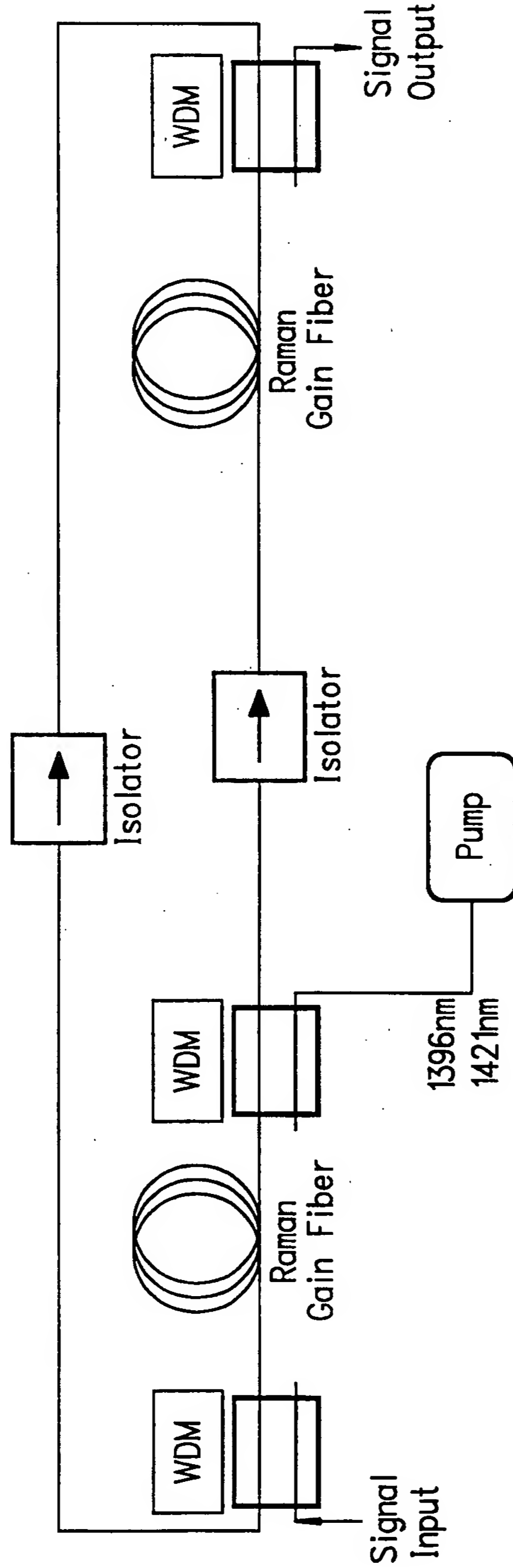


FIG.13

## Dual Stage Amplifier Design



- First stage is a low noise preamp
- Second stage is power amp, depleting pump power
- Isolators reduce multi-path interference (MPI) from Double-Rayleigh scattering

FIG. 14

S-band Amp Performance:  
Gain vs Wavelength

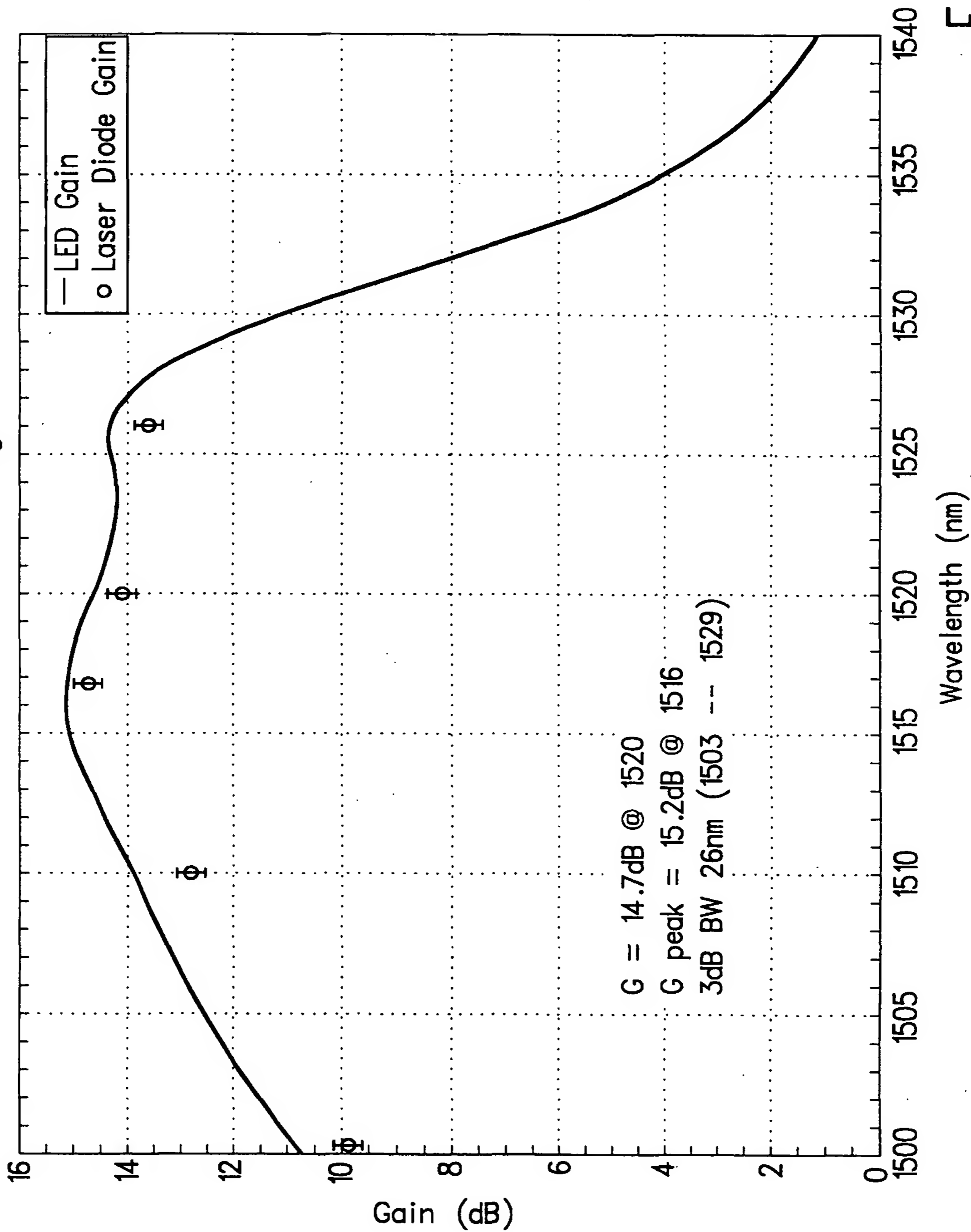


FIG. 15

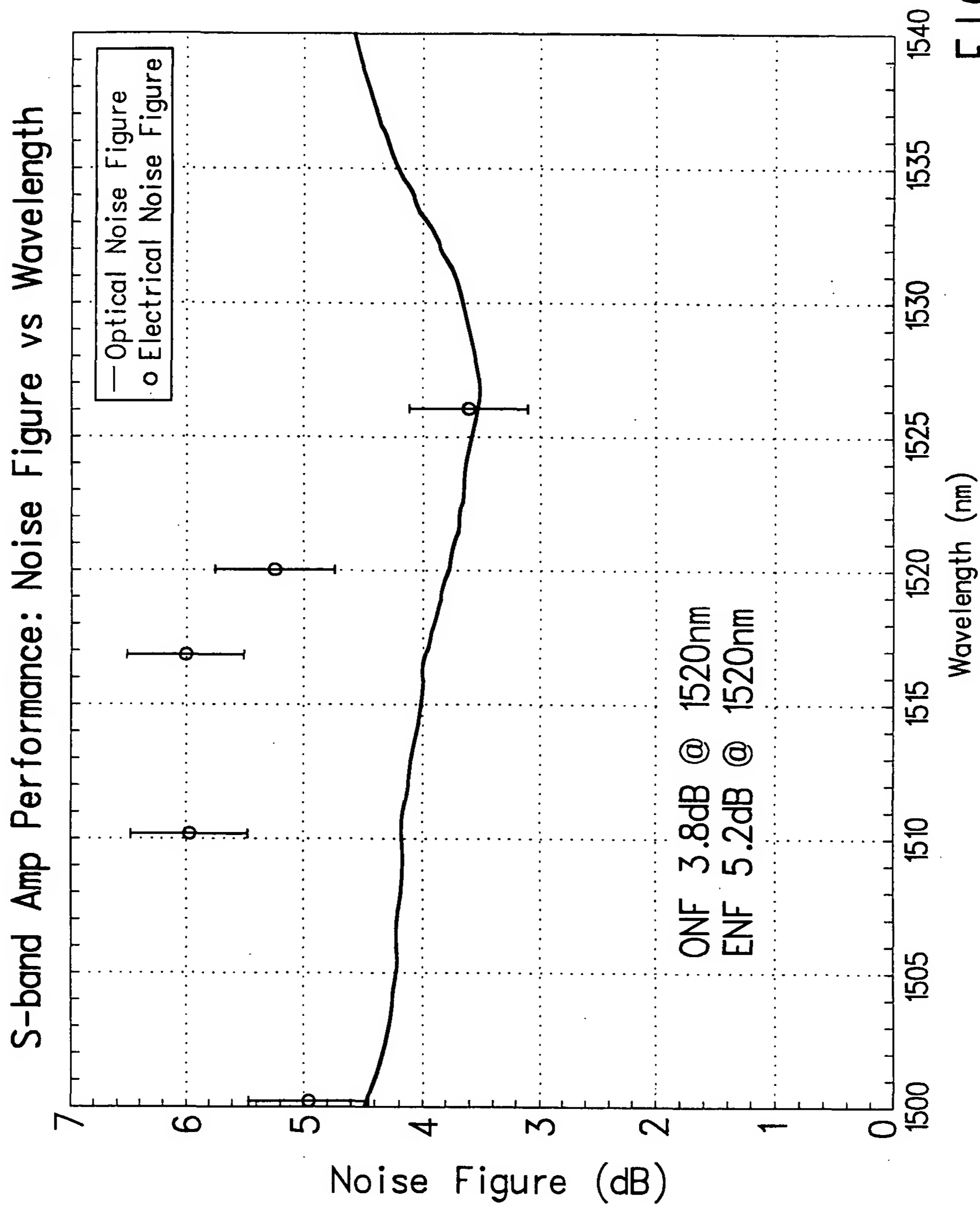


FIG. 16

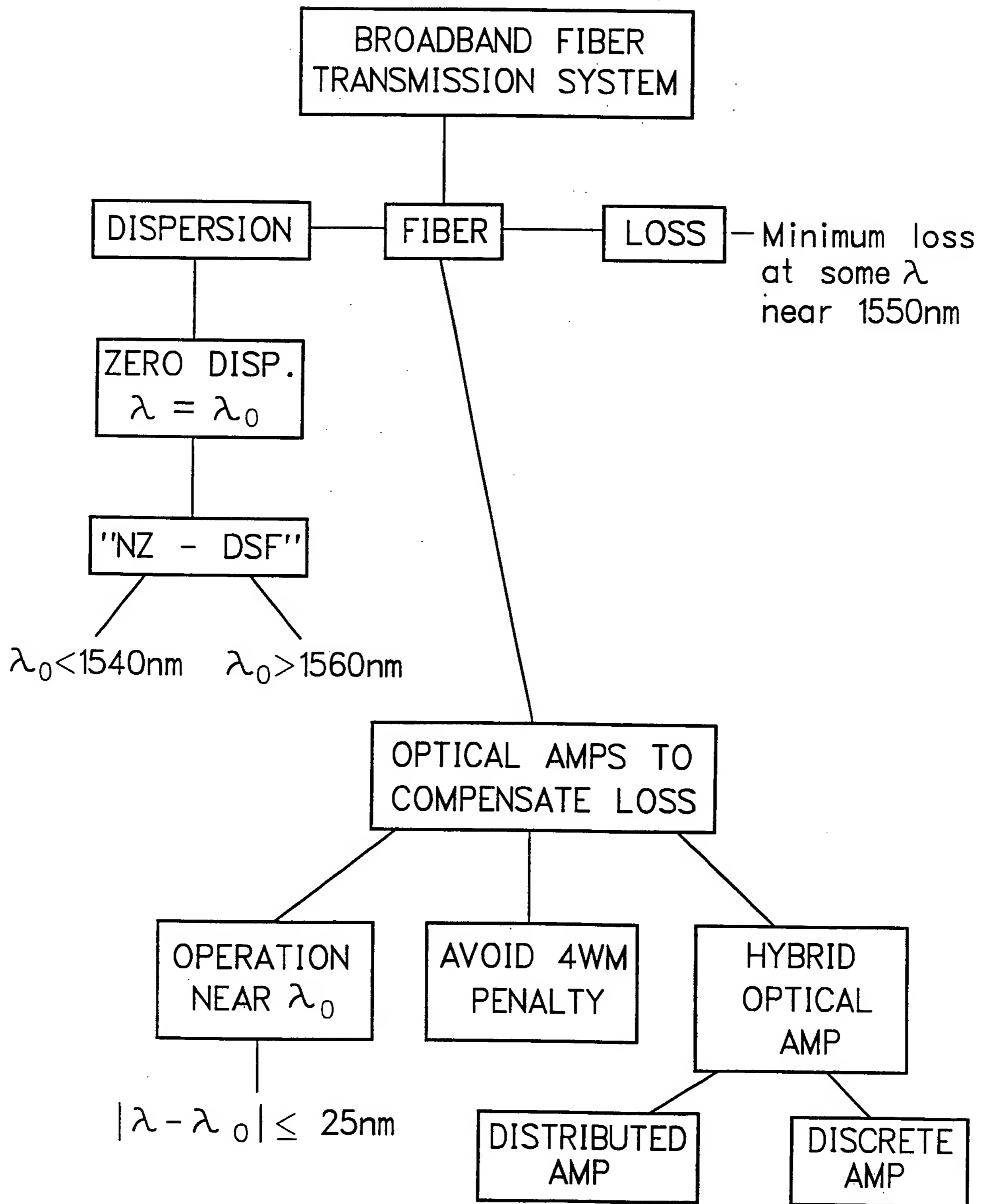


FIG. 17